

# (12) UK Patent Application

(19) GB (11) 2 229 052 (13) A

(43) Date of A publication 12.09.1990

(21) Application No 8917232.4

(22) Date of filing 28.07.1989

(30) Priority data

(31) 8905581

(32) 10.03.1989

(33) GB

(51) INT CL<sup>a</sup>  
B62J 6/00, H01H 9/00

(52) UK CL (Edition K)  
H2H HSV3 HSV4 H32  
H1N NAE N569 N607 N649 N664 N712 N714 N851  
U1S S1825 S1934 S2013

(56) Documents cited  
GB 2130015 A GB 1161302 A GB 1134462 A  
US 4204191 A

(58) Field of search  
UK CL (Edition J) H2H HSV1 HSV2 HSV3 HSV4  
INT CL<sup>a</sup> B60Q 1/26 1/44, B62J 6/00

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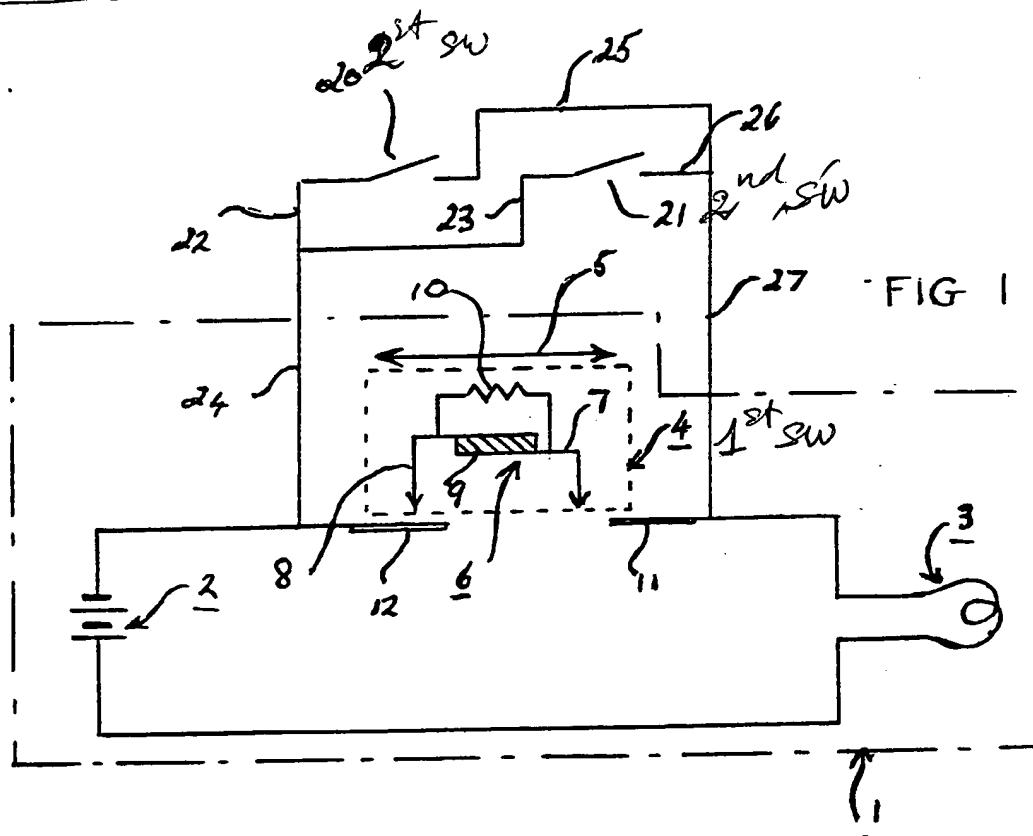
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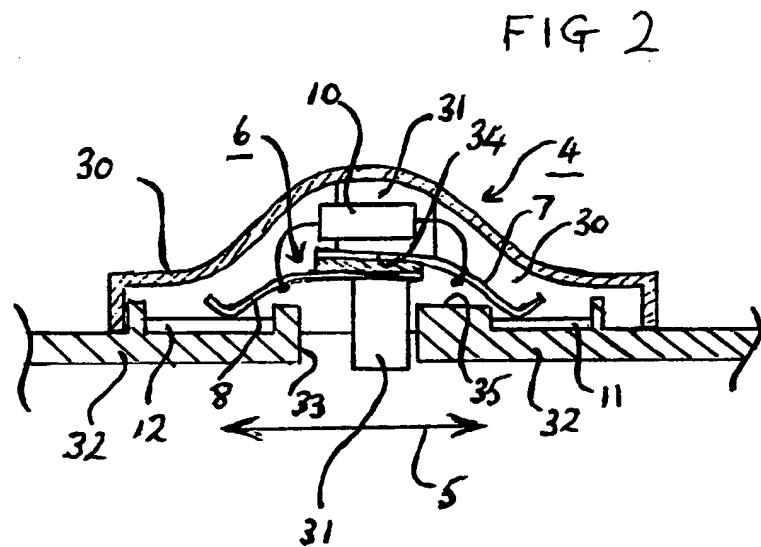
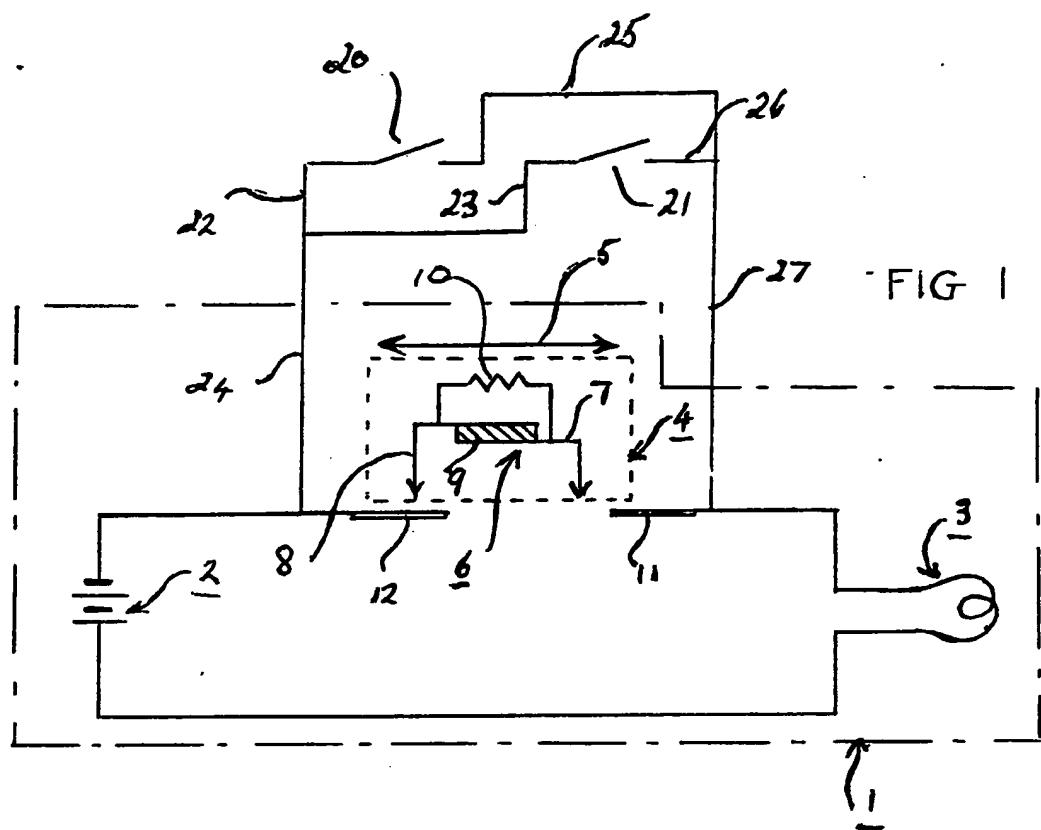
## (54) Bicycle brake light system

(57) A rear light 1 of a bicycle has a switch 4 with fixed contacts 11, 12 which can be interconnected via a movable contact assembly 6 having contact elements 7, 8 separated by insulation 9 and bridged by a resistor 10 so that in the ON state of the switch 4 a lamp 3 is energised via the resistor 10 to provide a normal rear light indication. Connected in parallel with the switch 4 and resistor 10 are switches 20, 21 operated by respective hand brake levers, whereby the lamp 3 is energised at a brighter level to indicate braking.



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## BICYCLE LIGHTING SYSTEMS

This invention relates to bicycle lighting systems. Such systems conventionally include a rear lamp as is well known for such systems.

There have also been proposals for brake-light systems for bicycles but these systems have, so far, been systems additional to the conventional well-known lighting systems. Clearly, it would be advantageous to obviate the necessity for the additional rear-mounted brake-light lamp by utilising the rear lamp of the conventional lighting system.

The present invention provides a particularly neat and cost effective manner of providing a single rear-mounted lamp which constitutes both the rear lamp and the brake-light lamp of the combined system by providing a rear lamp that has one level of luminosity when the lamp is operative as a rear light and a higher level of luminosity when the lamp is acting as a brake-light lamp.

The present invention does this by providing a bicycle lighting system including (a) a rear lamp having therein a bulb, a first switch and a resistor by which, upon operation of the first switch, the bulb is lit to a lower level of luminosity and (b) a second switch operable upon application of a brake of a bicycle fitted with the system, which second switch is connected in parallel with the resistor and the first switch thereby, upon operation of the second switch, to short out the resistor and first switch and thus light the bulb to a higher level of luminosity.

The first switch may include a first contact movable upon operation of the first switch, into contact with a second fixed contact.

In this case, the movable first contact may be a two-part contact of which the two parts are, of themselves, electrically insulated one from the other by electrically-insulating material and the resistor electrically interconnects the two parts in parallel to the insulating material, the resistor being secured to and movable with the two-part contact. The first switch may then include a switch operator in which both the two-part contact and the resistor are mounted. Conveniently and with this arrangement, the rear lamp may have a body relative to which the switch operator is slidable and have a third contact, a first part of the movable contact being permanently electrically engaged with the third contact but slidable thereon by slidable operation of the switch operator and the second part of the movable contact, by slidable operation of the switch operator, being slidable into and out of electrical engagement with the second contact and the second switch may then be electrically connected across the second and third contacts.

The second switch may be mounted on a brake lever of a bicycle fitted with the system so as to be operated by manual operation of the brake lever to apply the brake operated thereby. In this case, there may be provided two second switches mounted one on each of a pair of hand-brake levers of the bicycle fitted with the system so as to be operated by manual operation of the respective brake lever to apply a respective brake of a bicycle fitted with the system, the inputs of the second switches being commoned one to the other and the outputs of the second switches being commoned one to the other, the commoned inputs being electrically connected to the third contact and the commoned outputs being electrically connected to the second contact.

A form of brake-light system suitable for incorporation in the present invention is described and claimed in British Patent No. 2 130 015.

One embodiment of the present invention will now be described in greater detail by way of example only with reference to the accompanying drawing of which:-

Fig.1 shows the electrical circuit , and

Fig.2 shows the arrangement of the switch operator (with one side removed), the movable contact and the resistor

Referring, firstly, to Fig.1, the bicycle lighting system includes a rear-mounted lamp 1 indicated by the chain-dotted lines. The lamp houses a battery 2 and a bulb 3 with its attendant reflector and lens - both not shown. To operate the lamp as a rear light is a switch operator 4 indicated in dotted lines. the operator 4 is slidable in the direction of arrow 5.

The switch operator 4 includes a two-part contact 6 movable with the switch operator 4, of which the two parts 7 and 8 are secured together so as, of themselves, to be electrically insulated one from the other by insulating material 9. Electrically in parallel with the insulating material 9 is an electrical resistor 10.

The part 7 of the movable contact 6 is slidably engageable with a second contact 11 when the switch operator is slid to the right as viewed in Fig.1. The part 8 of the movable contact 6 is, at all times, slidably engaged with a third contact 12.

As so far described and as can be seen from Fig.1, with the switch operator 4 in the position shown in Fig.1, the electrical circuit between the battery 2 and the bulb 3 is broken and, therefore, the bulb 3 is not illuminated. By sliding the switch operator 4 to the right, the part 7 of the movable contact 6 will engage the second contact 11 and the circuit from the battery 2 to the bulb 3 will be made. However, the resistor 10 will be in series in this circuit and so will act as a voltage dropper. Thus, with only a reduced voltage from the battery 2 being allowed to feed the bulb 3, the bulb 3 will be illuminated at a lower level.

Considering now the remainder of the circuit of Fig.1, there is also provided two further switches 20 and 21. These are brake-light switches operated upon operation of the brakes of the bicycle to which

the system is fitted. These switches may conveniently be mounted on the handbrake levers of the bicycle (not shown) in the manner of the brake-light system described and claimed in British Patent No. 2 130 015.

As will be understood from Fig.1, closure of either or both switches 20 and 21 upon application of either of the respective brakes, will complete the circuit between battery 2 and the bulb 3. This will be effected by the inputs 22 and 23 of the switches 20 and 21 being commoned by a lead 27 electrically connected to the contact 11. This thus completed circuit parallels the movable contact 6 of the switch operator 4 and parallels the resistor 9 should it be in circuit by the switch operator 4 having been slid to the right. Thus, irrespective of whether the bulb 3 of the lamp 1 is being illuminated at the lower intensity as a rear light, the bulb 3 will now be illuminated at a higher intensity by virtue of the full voltage of the battery 2 being applied to the bulb 3.

In Fig.2 is a practical embodiment of the switch operator 4 of Fig.1.

The switch operator 4 comprises a hollow housing moulding 30 having an off-centre dependant spigot 31. The housing 30 is slidable in the direction of arrow 5, on the lamp body of which only a fraction of the top surface is shown. There is provided in this top surface a slot 33 into which projects the spigot 31. The top surface also carries the two contacts 11 and 12.

The movable contact 6 is mounted in the housing 30 on the spigot 31, the two parts 7 and 8 of the contact 6 being constituted by bowed phosphor bronze springs which, by virtue of the contact 6 abutting a shoulder 34 on the spigot 31 are resiliently urged towards the respective contacts 11 and 12.

The resistor 10 is contained in the housing 30 alongside the spigot 31 and above the contact 6 and is connected by its leads being soldered one to each of the parts 7 and 8 of the contact 6.

As shown in Fig.2, the switch operator 4 has been slid to the right as viewed in that Figure so that the part 7 of the contact 6 engages the contact 11 and the part 8 of the contact 6 engages the contact 12 thus "making" the rear light circuit .

When the switch operator 4 is slid to the left from its position in Fig.2, whilst the part 8 of the contact 6 will remain engaged with the contact 12, the part 7 of the contact 6 will be moved off of the contact 11 onto the top surface of the lamp body thus "breaking" the rear light circuit.

Whilst in the above described embodiment the switch operator is slidable to and fro, a rotational switch operator could equally well be used. Again, whilst in the above described embodiment the resistor and the two-part movable contact is shown as being mounted in the switch operator, the arrangement could equally be that the resistor and the two-part contact (whilst being assembled together in a unitary whole in the manner above described for the resistor and two-part contact shown in Fig.2), this assembly could be arranged for, say, pivotal movement to engage the part 7 with the second contact 11 by a switch operator having a cam surface engageable with the movable contact pivotally to move that contact upon movement of the switch operator.

## CLAIMS

1. A bicycle-lighting system including (a) a rear lamp having therein a bulb, a first switch and a resistor by which, upon operation of the first switch, the bulb is lit to a lower level of luminosity and (b) a second switch operable upon application of a brake of a bicycle fitted with the system, which second switch is connected in parallel with the resistor and the first switch thereby, upon operation of the second switch, to short out the resistor and first switch and thus light the bulb to a higher level of luminosity.
2. A system as claimed in Claim 1, wherein the first switch includes a first contact movable upon operation of the first switch, into contact with a second fixed contact.
3. A system as claimed in Claim 2, wherein the movable first contact is a two-part contact of which the two parts are, of themselves, electrically insulated one from the other by electrically-insulating material and the resistor electrically interconnects the two parts in parallel to the insulating material, the resistor being secured to and movable with the two-part contact.
4. A system as claimed in Claim 3, wherein the first switch includes a switch operator in which both the two-part contact and the resistor are mounted.
5. A system as claimed in Claim 4, wherein the rear lamp has a body relative to which the switch operator is slidable and has a third contact, a first part of the movable contact being permanently electrically engaged with the third contact but slidable thereon by slidable operation of the switch operator and the second part of the movable contact, by slidable operation of the switch operator, being slidable into and out of electrical engagement with the second contact.

6. A system as claimed in Claim 5, wherein the second switch is electrically connected across the second and third contacts.

7. A system as claimed in any one of the preceding Claims, wherein the second switch is mounted on a brake lever of a bicycle fitted with the system so as to be operated by manual operation of the brake lever to apply the brake operated thereby.

8. A system as claimed in Claim 7, wherein there are provided two second switches mounted one on each of a pair of hand-brake levers of the bicycle fitted with the system so as to be operated by manual operation of the respective brake lever to apply a respective brake of a bicycle fitted with the system, the inputs of the second switches being commoned one to the other and the outputs of the second switches being commoned one to the other, the commoned inputs being electrically connected to the third contact and the commoned outputs being electrically connected to the second contact.

9. A bicycle lighting system substantially as herein described with reference to and as illustrated in the accompanying drawing.

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